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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/902,699	07/12/2001	Hiroshi Miura	211375US2	1573

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EXAMINER

AGUSTIN, PETER VINCENT

ART UNIT	PAPER NUMBER
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2652

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DATE MAILED: 05/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/902,699

Applicant(s)

MIURA ET AL.

Examiner

Peter Vincent Agustin

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-12, 14 and 16-23 is/are rejected.
- 7) ☒ Claim(s) 6-9, 13-15 and 18-21 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 July 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. ____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☒ Interview Summary (PTO-413)
Paper No(s)/Mail Date ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Claim Objections

1. Claim 6-9 objected to because of the following informalities:

Regarding claim 6,

Line 11: "with the" should be --wherein a--.

Lines 11-12: "the timing" should be --a timing--.

Line 12: "being made" should be --are--.

Claims 7-9 are objected because they are dependent on claim 6.

2. Claims 14 & 15 are objected to because of the following informalities:

Regarding claim 14, line 2: "three power levels," should be --three power levels:--.

Claim 15 is objected to because it is dependent on claim 14.

3. Claims 18-21 objected to because of the following informalities:

Regarding claim 18,

Line 11: "with the" should be --wherein a--.

Line 12: "the timing" should be --a timing--.

Line 13: "being made" should be --are--.

Claims 19-21 are objected because they are dependent on claim 18.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-3, 10-12 & 22 rejected under 35 U.S.C. 102(b) as being anticipated by Kobayashi (US 5,144,615).

In regard to claim 1, Kobayashi discloses an information recording apparatus (figure 1) for recording multi-leveled information in a phase-change recording medium (20) by the application of a laser beam (11) thereto, comprising power level modification means (figure 2, element 104; column 2, line 61 thru column 3, line 13) for modifying a power level of said laser beam into two or more power levels so as to correspond to said multi-leveled information, and setting a plurality of recording mark units (column 3, line 12: record spot) including therein at least one recording mark to be formed, based on said modified power levels, so as to correspond to said multi-leveled information.

In regard to claim 10, Kobayashi discloses an information recording method (figure 1) for recording multi-leveled information in a phase-change recording medium (20) by the application of a laser beam (11) thereto, comprising the steps of: modifying a power level of said laser beam into two or more power levels (figure 2, element 104; column 2, line 61 thru column 3, line 13) so as to correspond to said multi-leveled information, and setting a plurality of recording mark units (column 3, line 12: record spot) including therein at least one recording mark to be formed, based on said modified power levels, so as to correspond to said multi-leveled information.

In regard to claim 22, Kobayashi discloses a phase-change recording medium (20) comprising a recording layer in which multi-leveled information can be recorded by an information recording method (figure 1) for recording multi-leveled information in a phase-change recording medium by the application of a laser beam (11) thereto, comprising the steps of: modifying a power level of said laser beam into two or more power levels (figure 2, element

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104; column 2, line 61 thru column 3, line 13) so as to correspond to said multi-leveled information, and setting a plurality of recording mark units (column 3, line 12: record spot) including therein at least one recording mark to be formed, based on said modified power levels, so as to correspond to said multi-leveled information.

In regard to claims 2 & 11, Kobayashi discloses that each of said recording mark units has a power level that corresponds to the total area of said one or more recording marks included in each of said recording mark units (column 3, lines 4-13).

In regard to claims 3 & 12, Kobayashi discloses that each of said recording mark units includes one recording mark and has a track-direction length in a range of 0.5 to 1.0 times a beam diameter defined by $1/e^2$ (see figure 7), and the area of said recording mark in each of said recording mark units is changed for recording said multi-leveled information (column 3, lines 4-13).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 4, 6, 16 & 18 rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi in view of Izumi et al. (hereafter Izumi) (US 5,598,392) or Horibe et al. (hereafter Horibe) (US 5,598,396).

In regard to claims 6 & 18, Kobayashi discloses an information recording and reproducing apparatus/method (figure 1) for recording multi-leveled information in a phase-

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change recording medium (20) by the application of a recording laser beam (11) thereto, reproducing multi-leveled information recorded in a phase-change recording medium by the application of a reproducing laser beam thereto, comprising: power level modification means/step (figure 2, element 104; column 2, line 61 thru column 3, line 13) for modifying a power level of said recording laser beam into two or more power levels so as to correspond to said multi-leveled information, and setting a plurality of recording mark units (column 3, line 12: record spot) including therein at least one recording mark to be formed, based on said modified power levels, so as to correspond to said multi-leveled information, and reproducing means/step (40) for reproducing said recording marks based on reference clock signals. In regard to claims 4 & 16, Kobayashi discloses an information reproducing apparatus/method (figure 1) for reproducing multi-leveled information recorded in a phase-change recording medium (20) in the form of recording marks by the application of a recording laser beam (11) thereto, by the application of a reproducing laser beam thereto, comprising: reproducing means (40) for reproducing said recording marks based on reference clock signals. Kobayashi shows in figure 3 a mark edge detector (401) and an intensity detector (402), but remains silent to whether a timing of detecting the mark edge of each of said recording marks and a timing of detecting the intensity of a reflection light from each of said recording marks are different.

Izumi discloses an optical reproducing apparatus wherein a timing of detecting a leading edge is different from a timing of detecting a trailing edge (see figure 3), in order to provide appropriate timing regardless of phase differences between the leading edge synchronizing signal and the trailing edge synchronizing signal (see column 15, lines 47-56). It would have been obvious to one of ordinary skill in the art at the time of invention by the applicant to have

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provided different timings for the mark edge detector and intensity detector of Kobayashi as suggested by Izumi, the motivation being to provide appropriate timing regardless of phase differences between the mark edge detector and the intensity detector.

Horibe discloses an optical reproducing apparatus (figure 16) wherein a timing of detecting an edge (figure 17C; column 2, line 3) is different from a timing of detecting an intensity (figure 17D; column 2, lines 1-3). It would have been obvious to one of ordinary skill in the art at the time of invention by the applicant to have provided different timings for the mark edge detector and intensity detector of Kobayashi as suggested by Horibe, the motivation being to optimize recording capacity (see column 1, lines 7-19).

Furthermore, in regard to claims 7 & 19, Kobayashi discloses that each of said recording mark units has a power level that corresponds to the total area of said one or more recording marks included in each of said recording mark units (column 3, lines 4-13). In regard to claims 8 & 20, Kobayashi discloses that each of said recording mark units includes one recording mark and has a track-direction length in a range of 0.5 to 1.0 times a beam diameter defined by $1/e^2$ (see figure 7), and the area of said recording mark in each of said recording mark units is changed for recording said multi-leveled information (column 3, lines 4-13).

8. Claims 5, 9, 17 & 21 rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi & Izumi as applied to claims 4, 6, 16 & 18 above, and further in view of Nagaai (JP 60187933 A).

For a description of Kobayashi & Izumi, see the rejection above. However, neither reference discloses a reproducing laser beam having a smaller beam diameter than a beam diameter of a recording laser beam in terms of a beam diameter defined by $1/e^2$.

Nagaai (see last three lines of constitution) discloses a reproducing laser beam having a smaller beam diameter than a beam diameter of a recording laser beam. It would have been obvious to one of ordinary skill in the art at the time of invention by the applicant to have used the reproducing laser beam having a smaller beam diameter than a beam diameter of a recording laser beam of Nagaai for the apparatus/method of Kobayashi & Izumi, the motivation being to attain accurate reproduction.

9. Claim 14 rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi in view of Iwasaki et al. (hereafter Iwasaki) (US 5,761,179).

For a description of Kobayashi, see the rejection above. However, Kobayashi does not disclose that said power level of said laser beam is modified into three power levels, a recording power level, an erasing power level and a bias power level, with the respective power levels thereof being set in a decreasing order of said recording power level, said erasing power level, and said bias power level (said recording power level > said erasing power level > said bias power level).

Iwasaki discloses a laser beam having a power level modified into three power levels (figure 7): a recording power level (Pw), an erasing power level (Pe) and a bias power level (Pr), with respective power levels being set in a decreasing order. It would have been obvious to one of ordinary skill in the art at the time of invention by the applicant to have modified the laser beam of Kobayashi into the three power levels suggested by Iwasaki, the motivation being to improve the quality of recording marks and to set an optimal recording power (column 3, lines 26-32).

10. Claim 23 rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi in view of Kasami et al. (hereafter Kasami) (US 6,312,780).

For a description of Kobayashi, see the rejection above. Furthermore, Kobayashi discloses that the recording layer (figure 4, element 23) of the phase-change recording medium comprises Sb and Te, and at least one element selected from the group consisting of Ag, In, Ge, Ga, B, Si and Al (column 4, lines 47-50). However, Kobayashi does not disclose that the Sb/Te content ratio is 2 to 5 in terms of atomic %.

Kasami discloses in figures 10 & 13 a recording layer having an Sb/Te content ratio of 2 to 5 in terms of atomic %. It would have been obvious to one of ordinary skill in the art at the time of invention by the applicant to provide the recording layer of Kobayashi with a material comprising of Sb and Te with an Sb/Te content ratio of 2 to 5 as suggested by Kasami, the motivation being to provide a phase-change recording medium with optimum characteristics (see column 12, lines 11-15).

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Hosoya (US 5,408,456) discloses a signal converting method for use in a recording method which can record data with high density and can stably detect a clock signal. The invention includes an edge detection signal used to produced a clock signal which is used to synchronize with data to be reproduced (column 3, lines 25-38).

Kobayashi et al. (US 6,324,145) discloses a digital data reproducing apparatus and a reproduction signal binarization level-correcting method. The apparatus includes a

synchronization means for producing a clock whose phase is synchronized with a leading edge and a trailing edge of the reproduced signal.

Shihara et al. (US 6,680,887) discloses a disk reproducing apparatus having a PLL clock generated in a jitter detection circuit.

Allowable Subject Matter

12. Claims 13 & 15 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

13. The following is a statement of reasons for the indication of allowable subject matter:

In regard to claims 13 & 15, no prior art of record alone or in combination discloses or suggests a multi-level recording method comprising the steps of modifying a power level of a laser beam into two or more power levels, **wherein at least one of said power levels is further changed in a level retention time thereof so as to correspond to said multi-leveled information**, and wherein said power level of said laser beam is modified into three power levels, a recording power level, an erasing power level and a bias power level, with the respective power levels thereof being set in a decreasing order of said recording power level, said erasing power level, and said bias power level, and wherein in modifying said power level of said laser beam, **at least one of said recording power level or said bias power level is further changed in a power level retention time thereof in accordance with said multi-leveled information**.

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14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter Vincent Agustin whose telephone number is (703) 305-8980. The examiner can normally be reached on Monday thru Friday 9:00AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa Nguyen can be reached on (703) 305-9687. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

PVA
04/27/2004



W. R. YOUNG
PRIMARY EXAMINER